Complex Software System Development
Modern Apps are Complex

Highly complex systems characterised by:

- Variety of Interfaces
  - Mobile devices
  - Tablets
  - Laptops
  - Desktops
- Decentralised control
  - Servers
  - Sensors/Actuators
  - Databases
  - External APIs

We will use Mobile/Web interchangeably
Speed of changes

- The technologies landscape is evolving rapidly and is extremely diverse.
- Cloud computing is causing profound changes in both business and technology landscape.
- New architectural models come in response to new technological developments.
- Changes in architectures are very cyclical in nature:
  - thin client -> fat client -> thin client
  - Centralised -> decentralised
- Open standards are becoming prevalent (e.g. SAP).
Cloud computing service models

https://www.youtube.com/watch?v=36zducUX16w 6 minutes
New trends

Cloud now supports

• Automated testing.
• Continuous Integration/Deployment.
• Serverless computing

Architectural trends

• No longer a monoculture approach
• Engineering for interoperability is key
• No one technology is the silver bullet
• Open source is winning
• Event sourcing is rising in popularity (Kafka)
• Move towards microservice architectures
Microservices Main Characteristics

1. Distributed Architecture
2. Separately Deployed
3. Service Component
4. Bounded Context
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Microservices Main Characteristics

1. Distributed Architecture
2. Separately Deployed
3. Service Component
4. Bounded Context
5. Share Nothing
6. Api Layer
7. Favor rewriting
Choosing a stack for prototyping

(1)

Choosing between

• Design a mobile app or design a web site optimised for a smartphone
• Second one is easier for beginners

Front-end stack provides

• Package Management
• Templating
• Testing framework
• Common widgets
• Databinding
• Server communication

Choosing a Front-end stack

• HTML/CSS/Bootstrap recommended for beginners
• For advanced users, use Angular, React or Vue.js
Choosing a stack for prototyping (2)

<table>
<thead>
<tr>
<th>Back</th>
<th>Back-end stack provides access to back-end services: APIs, data generation, external systems etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice</td>
<td>Choosing a back-end stack involves different considerations</td>
</tr>
<tr>
<td>Beginners</td>
<td>Can use Python back-end using the Flask web framework (which comes with the Jinja templating engine by default)</td>
</tr>
<tr>
<td>Database</td>
<td>If you need database, use SQLite, otherwise just simple JSON files</td>
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<tr>
<td>Advanced</td>
<td>Advanced users can adopt JavaScript for the back-end which requires the package management system for Node ‘npm’</td>
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<tr>
<td>See</td>
<td>See provided FAQ</td>
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Focus of this workshop

• Previous workshop was focusing on:
  • Designing user interfaces: User Experience
  • Front End Stack: Javascript and other tools

• This workshop is more on:
  • API design
  • Cloud deployment
  • Testing
  • Data integration
  • Using tools to manage development